Observations on a Light-giving Coleopterous Larva.

By Dr. Hermann Burmeister, F.M.L.S.

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In a box of books lately (April 18, 1871) received from London, I was pleased to find the continuation of the 'Journal of the Linnean Society' in exchange for the 'Annals of the Public Museum of Buenos Ayres.'

Amongst the papers which attracted my attention was one on a light-giving Coleopterous larva, named *Astraptor illuminator* (vol. x. p. 74), collected by Mr. A. Fry at Rio de Janeiro, and described and figured (Pl. I.) by Mr. A. Murray.

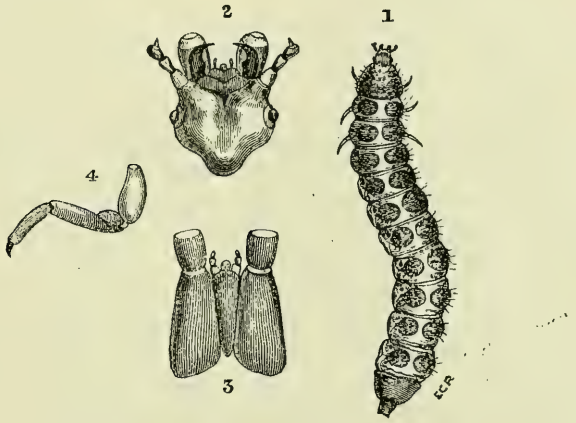
To the detailed description by Mr. Murray, some futher notices are added in the same volume (p. 503) by another observer, Mr. R. Trimen, wherein he mentions a similar larva found here in Buenos Ayres, by Mr. Ogilvie, twelve years ago.

I was so fortunate as to observe the same larva at Paranà, the former capital of the Argentine Republic, in August 1858; and as Mr. Trimen's notice is rather brief, I thought it might be of some interest to the Society to receive a fuller description, with figures, which I therefore now send, in the hope that this account may bring forward some information as to the imago state of the insect produced from the larva, which has now been known for some time. I say advisedly that the larva has long been known, because Azara speaks of the same larva in his 'Voyage,' tom. i. p. 214, alluding to the double light from the body; and another full description of a nearly allied species from Brazil is given by Prof. F. T. Reinhardt, of Copenhagen, in a Danish periodical work which I do not exactly remember, but which I believe to be the 'Videnskabelige Meddelelser' for 1854.

My larva was of the same size as that described by Azara, 2 inches long and a $\frac{1}{4}$ inch broad. The body was composed of the head and thirteen joints, of which the largest is that next the head, and the smallest is the short tube containing the anus. The colour was yellowish-brown, like that of the meal-worm (the larva of *Tenebrio molitor*), with the head rather darker. On examining the insect attentively, I could perceive that a large part of the surface of the body (namely the whole of the underside) and the incisions between the segments were of a paler, yellowish-white colour, and the skin was here very thin and soft; but on the upperside every one of the eleven segments, after

that immediately behind the head, had two small yellow-brown horny plates, one on each side of the dorsal vessel; the prothoracic segment and the penultimate segment were entirely covered with undivided horny plates of a rather darker colour; and the small terminal segment had a darker brown lateral scale on each side. The body of this larva was not smooth, like that of the meal-worm, but clothed with short hairs or bristles, placed on the dorsal horny plates, and with their points directed outwards, the remaining portions of the segments being smooth or naked.

My fig. 1 gives an exact view of this construction of the larva, natural size.



The head (fig. 2, magnified) is small in comparison with the large prothoracic segment, and somewhat retracted within that segment; it is covered by a darker horny skin, and is of a transverse oval form, with a short neck posteriorly, which fits into the anterior opening of the prothoracic segment. On the most prominent parts of the sides of the head are situated the eyes, which are black; in front of these are the short antennæ, placed on small prominences of the anterior lateral surface of the head. The antennæ consist of four joints: the first and broadest is soft, white, and conical; the second of the same length as the first, but more slender, horny, and dark brown, like the succeeding joints, and obconical; the third is oval, and rather thicker than the second; the fourth, inserted on the inner edge of the third

before the end, is a very short and thin point. Between the two prominences on which the antennæ are placed, is an impressed angular line, starting from the anterior base of each eminence, and emitting posteriorly, from the angle, another, short impressed line, which becomes evanescent between the eyes. This transverse line separates the small clypeus, of the same angulated figure, which has its anterior margin likewise angulated, supporting the soft (not horny) white upper lip, which is rather broader than long, and emarginated in the middle of the free margin. On the sides of this upper lip, next to the antennæ, the mandibles are conspicuous as two strong horny hooks of very dark colour, with a thin but very acute curved tip and a small angular tooth in the middle of the inside. Beneath the mandibles are situated the maxillæ, united with the intervening under lip, into a strong horny plate, divided by two ridges into three parts (fig. 3, magnified).

Of these three parts, the lateral ones are the broadest and longest, representing the trunks of the maxillæ, broadest at the base, narrowing to the tip, where there is a small cylindrical appendage, which appears to be the maxillary palpus, formed of a single great joint, united to the maxilla by a small and soft white ring, which, judging by analogy from the antennæ and the labial palpi, may be the first joint of the maxillary palpus. At the other end there is also a soft white convex surface, which seems as though divided by a circular impression in the middle into two joints—a small circular one in the centre, and a larger annular one around it. If we look upon these two white parts of the tip of this curious maxillary palpus as two different joints, the palpus, including the white ring at the base, will be four-jointed, as is usual in Coleopterous larvæ. Behind this must have been concealed the internal jaw of the maxillæ, which I did not see, as it was much retracted in the interior of the mouth during the life of the animal, and I was not able to make a better examination after the death of the creature, having unfortunately lost it.

The smaller piece between the two trunks of the maxillæ, is the mentum of the under lip, a triangular scale, with the pointed end behind, and the base in front. At this end are attached the three-jointed labial palpi, and between them the very small oval tongue or ligula. Each palpus has, like the antennæ, a soft white basal joint, and two slender horny joints, the last being a very thin point at the end of the palpus. The ligula be-

tween them was likewise soft, not horny, but not entirely white, thus differing from the basal joints of the antennæ and the palpi.

The body of the larva is not perfectly cylindrical, but rather depressed, having an elliptical outline, and without a sharp margin; it is of a soft fleshy consistence, with horny plates on each segment, these plates bearing the strong hairs or short bristles already described. The segment immediately behind the head is longer, rather trapezoidal, with curved margins, and entirely covered by a single horny plate; the two following segments are the shortest of all; the following segments almost imperceptibly increase in length, till we come to the last, which is somewhat trapezoidal, being much attenuated posteriorly, where it emits the anal tubus, which serves as a short, very mobile, accessory organ of movement.

On the three segments, which correspond to the thorax of the imago, are attached three pairs of rather long, but thin (and very active) legs, each composed of five different joints (fig. 4, magnified). The first joint is the stoutest, and articulated to the body near the middle of the underside of each segment; it is directed backwards and somewhat outwards, reaching as far as the end of the segment. After this first joint, corresponding to the coxa of the perfect insect, follows the short, oblique, truncate trochanter, and then the cylindrical femur, which is the longest joint of all; articulated to its end is the rather shorter and thinner tibia, terminating in a single mobile hook, which corresponds to the tarsus and unguis of the imago.

No other particular external organs are visible except the spiracles, which form nine black dots on each side of the body:—the first on the prothoracic segment, near the margin, behind the first pair of legs; the other eight on the fifth to twelfth segments, immediately before the outer margin of the horny dorsal plates.

The animal was brought to me by a friend, who had taken it in rotten wood; it moved about very actively, defending itself from all attacks by its rapid movements, opening its sharp-pointed mandibles, and closing them instantly if any object was submitted to its bites; it perforated with ease the skin of my fingers. In its movements it turned the end of the body against the enemy, slinging it from side to side, and ejecting from the anus a clear reddish-brown fluid, which had a corrosive effect upon my skin. During all this time it was emitting light, visible even in full daylight, but which was of course more perfect during the night,

as I had preserved the animal living in my room under a drinking-glass. This light, which the animal can intensify or diminish at will, was of two different colours.

At the head is emitted an entirely red light, like a burning coal; but on thebody the light was greenish white, like that of the glowworm, or of phosphorus. Sometimes, when the animal had been disturbed, the light was so strong that I could observe the whole figure of the animal perfectly well during the night, if I took it in my hand and looked at it through a lens. I then observed that the light of the body was not homogeneous, but was arranged in ten points of light on each side of the body, corresponding to the incisions between the segments. I saw also a small luminous spot behind the dorsal plates in the soft skin connecting them. The segment behind the head and that preceding the anal tube, both which are covered with undivided horny plates, had no luminous points; but the connecting skin between the head and the next segment also emitted a bright red light. By this arrangement of ten luminous points on each side of the larva, when seen from a little distance on a dark night it appears as twenty small points of greenish-white light, of the size of the head of a strong pin, arranged in two parallel rows, and following a larger point of red light placed centrally in front of the two rows.

This larva lived for some days in my room, amongst pieces of rotten wood, but did not feed or change to the chrysalis state: it was lost through the negligence of my servant, who took the glass from the table to clean it; so I am perfectly unacquainted with the imago it would have produced.

Having regard to the general figure of this larva, more especially to the configuration of the head and the oral organs, I have no doubt that it belongs the light-giving genus *Pyrophorus*, of the family *Elateridæ*. The larvæ of this group of Coleoptera have the same general form, the cylindrical or oval-cylindrical body (whence some have acquired the familiar name of wire-worms), and generally the stronger horny skin and the same construction of the mouth; especially the peculiar form of the trunks of the maxillæ united with the mentum agrees perfectly with these organs in the luminous larva in question.

Many larvæ of this family have been well described and figured by Bouché, Lequin, Perris, Westwood, and others (*see* Lacordaire, Hist. Nat. des Coléoptères, tom. iv. p. 134), all agreeing

in the principal characters which I have here described from my luminous larva. As the only luminous insects which occur in this country belong to the *Pyrophori* and *Lampyridæ*, I feel tolerably certain that this larva belongs to *Pyrophorus*, because the larvæ of *Lampyridæ* have a broader, softer, and flatter body, and their oral parts must be smaller, at least in those of this country, none of which exceeds an inch in length. But the largest *Pyrophorus* from the Argentine Republic (*P. punctatissimus*, Bl. Candèze, Monog. iv. p. 17) is 1½ inch long, and bears the same proportion to my larva that the large larva of *Agrypnus fuscipes*, described by Lequin, bears to the imago-state of *Anthia sexguttata*, (Guérin, Mag. de Zool. 1832, ix. 41). Indeed this larva has many points of resemblance to the larva here described; but it belongs to another group of the *Elateridæ*, in which the larva has the anal tube retracted and covered by the preceding elongated segment, which bears the form of a strong denticulated horny fork.

My larva agrees with others of the same family in the projecting anal tube and the unarmed preceding segment, like that of *El. sanguineus*. Erichson mentions a larva of *Pyrophorus* from Cuba (Wiegmann's Archiv, 1841, tom. i. p. 87), and says that the body is softer, more fleshy, and the segments are more separated —characters which agree very well with the construction of my larva; but he also mentions that the last segment bears many small humps, which I certainly did not notice in my specimen. This may, indeed, be a specific character, and not a generic one.

The conclusion at which I have arrived is therefore this— that the luminous larva observed by Azara, Ogilvie, and myself is that of *Pyrophorus punctatissimus*.

With reference to Mr. Murray's *Astraptor illuminator*, it appears to me not to be a larva of one of the *Elateridæ*, but rather to be that of one of the *Lampyridæ*. The figure given of the mouth shows none of the characters of a larva of *Elateridæ*, but agrees far better with the structure of the larva of the *Lampyridæ*. This view is also supported by the retracted head, the depressed form of the body, the sharp lateral margin, and the distinctly separated segments, which form, on each, projecting angles before the union with the adjoining segment; all these are characters distinctive of the *Lampyridæ* larvæ.

Buenos-Ayres, April 25, 1871.